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EXAMINER	
SINGH, DALZID E	

ART UNIT	PAPER NUMBER
2633	

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Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/076,182	FABINY, LARRY	
	Examiner	Art Unit	
	Dalzid Singh	2633	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *12 February 2002*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-39* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☒ Claim(s) *16-22,31,32,38 and 39* is/are allowed.

6)☒ Claim(s) *1-6,8-15,23-29 and 33-36* is/are rejected.

7)☒ Claim(s) *7,30 and 37* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *12 February 2002* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *8/11/03;6/25/02;2/12/02*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Double Patenting

1. The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. See *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970);and, *In re Thorington,* 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent is shown to be commonly owned with this application. See 37 CFR 1.130(b).

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

2. Claims 23-26 and 31-35 are rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1, 4, 8, 14, 15, 19, 24, 29 and 30 of U.S. Patent No. 6,751,415 (hereinafter "patent 415"). Although the

conflicting claims are not identical, they are not patentably distinct from each other because the current application and patent 415 claims the same subject matter.

Regarding claim 23, patent 415 discloses a wavelength router for receiving, at an input port, light having a plurality of spectral bands and directing subsets of the spectral bands to respective ones of a plurality of output ports, (see claim 1 of the patent or col. 12, lines 11-24), the wavelength router comprising:

an optical train (optical arrangement) disposed between the input port and output ports providing optical paths for routing the spectral bands, the optical train including a quarter-wave plate (see claim 4 or col. 12, lines 30-32, patent 415 discloses that the polarization rotation element is quarter-wave plate) and a dispersive element (see claim 8 or col. 12, lines 43-45) disposed to intercept light traveling from the input port, the optical train being configured so that light encounters the dispersive element and the quarter-wave plate twice before reaching any of the output ports (see claim 29 or col. 14, lines 40-43; patent 145 discloses that the optical arrangement, which comprises of dispersive element and the polarization rotation element, is disposed such that each optical path is routed through the arrangement more than twice); and,

a routing mechanism having a plurality of retroreflecting elements (see claim 14 or col. 12, lines 57-60).

Patent 415 differs from the claimed invention in that patent 415 do not specifically disclose that each retroreflecting element being configured to reflect a respective one of the spectral bands an odd number of times greater than two to direct the respective one of the spectral bands to different output ports depending on a state of the retroreflecting

element. However, in claim 29 or col. 14, lines 40-43, patent 415 discloses that the optical arrangement is disposed such that each optical path is routed through the arrangement more than twice. Therefore, based on this it would have been obvious that the retroreflecting element can be configured to reflect a respective one of the spectral bands an odd number of times greater than two. For example, the retroreflecting element can be configured to reflect a respective one of the spectral bands five times, which is an odd number greater than two. The motivation of configuring such is to alter state of polarization of the optical beam at a desired angle and reduce polarization dependent loss.

Regarding claim 24, patent 415, in claim 15, further discloses that the wavelength router comprises:

the optical train further includes a lens (see col. 12, line 63);

the dispersive element comprises a reflection grating (see col. 12, lines 64);

light coming from the input port is collimated by the lens and dispersed by the reflection grating as a plurality of angularly separated beams corresponding to the spectral bands (see col. 13, lines 1-4);

the angularly separated beams are focused by the lens on the respective retroreflecting elements (see col. 13, lines 5-8); and

the quarter-wave plate is disposed between the reflection grating and the routing mechanism (see col. 12, lines 30-32, patent 415 discloses that the polarization rotation element is quarter-wave plate; in col. 13, lines 1-8, patent 415 discloses that the beams, reflected from the reflective grating, are focus by the lens to encounter the polarization

rotation element and the dynamically configurable element; such optical path indicates that the polarization rotation element or the quarter-wave plate is disposed between the reflection grating and the routing mechanism).

Regarding claim 25, patent 415, in claim 19, further discloses that the wavelength router comprises:

the optical train further includes a first lens and a second lens (see col. 13, line 28);

the dispersive element comprises a transmissive grating (see col. 13, lines 29-30);

light coming from the input port is collimated by the first lens and dispersed by the transmissive grating as a plurality of angularly separated beams corresponding to the spectral bands (see col. 13, lines 33-37);

the angularly separated beams are focused by the second lens on the respective retroreflecting elements (see col. 13, lines 38-41); and

the quarter-wave plate (see claim 4 of patent 415) is disposed between the transmissive grating and the routing mechanism (in col. 13, lines 38-51, patent 415 discloses that the beams, transmitted through the transmissive grating, are focus by the lens to encounter the polarization rotation element and the dynamically configurable element; such optical path indicates that the polarization rotation element is disposed between the transmissive grating and the routing mechanism).

Regarding claim 26, patent 415, in claim 24, further discloses that the wavelength router comprises:

the dispersive element comprises a reflection grating (see col. 14, lines 4);

the optical train includes a curved reflector disposed to intercept light from the input port, collimate the intercepted light, direct the collimated light toward the reflection grating, intercept light reflected from the reflection grating, focus the light, and direct the focused light on the respective retroreflecting elements (see col. 14, lines 5-25; the dynamically configurable element is the retroreflecting element).

Regarding claim 33, patent 415, in claim 30, discloses method for directing a light beam having a plurality of spectral bands received at an input port, the method comprising:

collimating the light beam (see col. 14, lines 47);

dispersing the collimated light beam into a plurality of angularly separated beams corresponding to the spectral bands (see col. 14, lines 48-50);

propagating the angularly separated beams through a quarter-wave plate (see col. 14, lines 52-53 and col. 12, lines 30-31; quarter-wave plate rotates polarization of the optical signal);

focusing the angularly separated beams (see col. 14, lines 51); and

retroreflecting the angularly separated beams by reflecting each such angularly separated beam.

Patent 415 differs from the claimed invention in that patent 415 does not specifically disclose retroreflecting the angularly separated beams by reflecting each such angularly separated beam an odd number of times. However, in col. 14, lines 40-43 the patent discloses that the optical arrangement, which comprises of dispersive

element and the polarization rotation element, is disposed such that each optical path is routed through the arrangement more than twice. Therefore, based on this, it would have been obvious to retroreflect the optical beam at odd number of times. For example, the retroreflecting element can be configured to reflect a respective one of the spectral bands five times, which is an odd number greater than two. The motivation of configuring such is to alter state of polarization of the optical beam at a desired angle and reduce polarization dependent loss.

Regarding claim 34, as discussed above, patent 415 discloses that optical beam is routed three times (as discussed above, the retroreflecting element can be configured to route the optical three times).

Regarding claim 35, as discussed above, patent 415 discloses that optical beam is routed through quarter-wave plate (in claim 4, patent 415 discloses quarter-wave plate in which the optical path is routed).

3. Claims 1-6, 8-15, 27-29 and 33-36 are rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1, 8-10, 14, 15, 19, 24 and 29-31 of U.S. Patent No. 6,751,415 (hereinafter "patent 415") in view of Holland (US Patent No. 6,396,575).

Regarding claim 1, patent 415 discloses a wavelength router for receiving, at an input port, light having a plurality of spectral bands and directing subsets of the spectral bands to respective ones of a plurality of output ports, (see claim 1 of the patent or col. 12, lines 11-24), the wavelength router comprising:

an optical train (optical arrangement) disposed between the input port and output ports providing optical paths for routing the spectral bands, the optical train including a polarization rotation element and a dispersive element (see claim 8 or col. 12, lines 43-45) disposed to intercept light traveling from the input port, the optical train being configured so that light encounters the dispersive element and the polarization rotation element twice before reaching any of the output ports (see claim 29 or col. 14, lines 40-43; the patent discloses that the optical arrangement, which comprises of dispersive element and the polarization rotation element, is disposed such that each optical path is routed through the arrangement more than twice); and

a routing mechanism having at least one dynamically configurable routing element to direct a given spectral band to different output ports depending on a state of the dynamically configurable routing element (see claim 1 or col. 12, lines 18-21).

Patent 415 discloses wavelength router as disclosed above comprising of polarization rotation element and differ from the claimed invention in that patent 415 does not specifically disclose that the optical train (optical arrangement) includes a half-wave plate. However, it is well known that there are various types of polarization rotation element, such as quarter-wave plates, half-wave plates or full-wave plates. Holland is cited to show such well known concept. In col. 4, lines 40-47, Holland discloses various types of wave plates. Therefore, it would have been obvious to an artisan of ordinary skill at the time the invention was made to provide a half-wave plate as the polarization rotation element to the wavelength router of patent 415. One of ordinary skill in the art would have been motivated to so such in order to retard the

polarization state of the optical signal and induce a unique state of polarization to the signal.

Regarding claim 2, patent 415 discloses optical train comprises a free-space optical train (the optical arrangement comprises of free space elements such as polarization rotation element and routing element).

Regarding claim 3, patent 415 discloses that the routing mechanism includes a plurality of retroreflecting elements, each associated with a respective one of the spectral bands (see claim 14 or col. 12, lines 57-60).

Regarding claim 4, as disclose above, patent 415 discloses that at least one of the retroreflecting elements is configured to reflect the given spectral band an even number of times (see claim 29 or col. 14, lines 40-43; the patent discloses that the optical arrangement, which comprises of dispersive element and the polarization rotation element, is disposed such that each optical path is routed through the arrangement more than twice; since the retroreflection reflects the optical signal, therefore it would have been obvious that the retroreflection could reflect the optical signal two times, which is an even number).

Regarding claim 5, as discussed above, patent 415 discloses that each optical path is routed through the arrangement more than twice and differ from the claimed invention in that patent 415 does not specifically disclose that each of the retroreflecting elements is configured to reflect the given spectral band twice. However, since the optical path is routed more than twice, therefore it would have been obvious that the

optical signal is configured to reflect the given spectral band twice; see col. 14, lines 57-60, patent 415 discloses retroreflecting elements).

Regarding claim 6, the combination of patent 415 and Holland discloses that the angularly separated beams are retroreflected (see claim 29 or col. 14, lines 57-60 of patent 415) and discloses routing mechanism having at least one dynamically configurable routing element (see claim 1 or col. 12, lines 18-21 of patent 415). The combination differs from the claimed invention in that the combination does not specifically disclose each of the retroreflecting elements includes a rotational degree of freedom. However, since the combination discloses that the routing of the beam comprise of retroreflecting and dynamically configurable element, therefore it would have been obvious that the retroreflecting element can be made to have rotational degree of freedom. One of ordinary skill in the art would have been motivated to do such in order to route the optical beam to a selective output port.

Regarding claim 8, patent 415 discloses that the dispersion element comprises a grating (see claims 9, col. 12, lines 47 or claim 10, col. 12, lines 49).

Regarding claim 9, patent 415, in claim 15, further discloses that the wavelength router comprises:

the optical train further includes a lens (see col. 12, line 63);

the dispersive element comprises a reflection grating (see col. 12, lines 64);

light coming from the input port is collimated by the lens and dispersed by the reflection grating as a plurality of angularly separated beams corresponding to the spectral bands (see col. 13, lines 1-4);

the angularly separated beams are focused by the lens on respective dynamically configurable routing elements comprised by the routing mechanism (see col. 13, lines 5-8); and

the polarization rotation element is disposed between the reflection grating and the routing mechanism (in col. 13, lines 1-8, patent 415 discloses that the beams, reflected from the reflective grating, are focus by the lens to encounter the polarization rotation element and the dynamically configurable element; such optical path indicates that the polarization rotation element is disposed between the reflection grating and the routing mechanism).

Patent 415 discloses wavelength router as disclosed above comprising of polarization rotation element and differ from the claimed invention in that patent 415 does not specifically disclose that the optical train (optical arrangement) includes a half-wave plate. However, it is well known that there are various types of polarization rotation element, such as quarter-wave plates, half-wave plates or full-wave plates. Holland is cited to show such well known concept. In col. 4, lines 40-47, Holland discloses various types of wave plates. Therefore, it would have been obvious to an artisan of ordinary skill at the time the invention was made to provide a half-wave plate as the polarization rotation element to the wavelength router of patent 415. One of ordinary skill in the art would have been motivated to so such in order to retard the polarization state of the optical signal and induce a unique state of polarization to the signal.

Regarding claim 10, as discussed above, the combination of patent 415 and Holland discloses that the half-wave plate (the polarization rotation element) is disposed between the lens and the reflection grating.

Regarding claim 11, as discussed above, the combination of patent 415 and Holland discloses that the half-wave plate is disposed between the lens (focusing lens) and the routing mechanism(or the dynamically configurable element).

Regarding claim 12, patent 415, in claim 19, further discloses that the wavelength router comprises:

the optical train further includes a first lens and a second lens (see col. 13, line 28);

the dispersive element comprises a transmissive grating (see col. 13, lines 29-30);

light coming from the input port is collimated by the first lens and dispersed by the transmissive grating as a plurality of angularly separated beams corresponding to the spectral bands (see col. 13, lines 33-37);

the angularly separated beams are focused by the second lens on respective dynamically configurable routing elements comprised by the routing mechanism (see col. 13, lines 38-41); and

the polarization rotation element is disposed between the transmissive grating and the routing mechanism (in col. 13, lines 38-51, patent 415 discloses that the beams, transmitted through the transmissive grating, are focus by the lens to encounter the polarization rotation element and the dynamically configurable element; such optical

path indicates that the polarization rotation element is disposed between the transmissive grating and the routing mechanism).

Patent 415 discloses wavelength router as disclosed above comprising of polarization rotation element and differ from the claimed invention in that patent 415 does not specifically disclose that the optical train (optical arrangement) includes a half-wave plate. However, it is well known that there are various types of polarization rotation element, such as quarter-wave plates, half-wave plates or full-wave plates. Holland is cited to show such well known concept. In col. 4, lines 40-47, Holland discloses various types of wave plates. Therefore, it would have been obvious to an artisan of ordinary skill at the time the invention was made to provide a half-wave plate as the polarization rotation element to the wavelength router of patent 415. One of ordinary skill in the art would have been motivated to so such in order to retard the polarization state of the optical signal and induce a unique state of polarization to the signal.

Regarding claim 13, as discussed above, the combination of patent 415 and Holland discloses that the half-wave plate is disposed between the transmissive grating and the second lens.

Regarding claim 14, as discussed above , the combination of patent 415 and Holland discloses that the half-wave plate is disposed between the second lens and the routing mechanism.

Regarding claim 15, patent 415, in claim 19, further discloses that the wavelength router comprises:

the dispersive element comprises a reflection grating (see col. 14, lines 4);

the optical train farther includes a curved reflector disposed to intercept light from the input port, collimate the intercepted light, direct the collimated light toward the reflection grating, intercept light reflected from the reflection grating, focus the light, and direct the focused light on respective dynamically configurable routing elements comprised by the routing mechanism (see col. 14, lines 5-25).

Regarding claim 27, patent 415 discloses a wavelength router for directing a light beam having a plurality of spectral bands received at an input port, the method comprising:

collimating the light beam (see col. 14, line 47);

dispersing the collimated light beam into a plurality of angularly separated beams corresponding to the spectral bands (see col. 14, lines 48-50);

propagating the angularly separated beams through a polarization rotating element (see col. 14, lines 52-53);

focusing the angularly separated beams (see col. 14, line 51); and

routing the angularly separated beams to respective ones of a plurality of output ports (see col. 14, lines 55-56).

Patent 415 discloses wavelength router as disclosed above comprising of polarization rotation element and differ from the claimed invention in that patent 415 does not specifically disclose a half-wave plate. However, it is well known that there are various types of polarization rotation element, such as quarter-wave plates, half-wave plates or full-wave plates. Holland is cited to show such well known concept. In col. 4,

lines 40-47, Holland discloses various types of wave plates. Therefore, it would have been obvious to an artisan of ordinary skill at the time the invention was made to provide a half-wave plate as the polarization rotation element to the wavelength router of patent 415. One of ordinary skill in the art would have been motivated to so such in order to retard the polarization state of the optical signal and induce a unique state of polarization to the signal.

Regarding claim 28, patent 415 discloses that the angularly separated beams to respective ones of the plurality of output ports comprises retroreflecting the angularly separated beams by reflecting each such angularly separated beam an even number of times (see col. 14, lines 40-43; the patent discloses that the optical arrangement, which comprises of dispersive element and the polarization rotation element, is disposed such that each optical path is routed through the arrangement more than twice; for example, the optical path could be routed through the arrangement two times, which is an even number of times).

Regarding claim 29, as discussed above, the combination of patent 415 and Holland discloses angularly separated beams to respective ones of the plurality of output ports further comprises again propagating the angularly separated beams through the half-wave plate.

Regarding claim 36, patent 415, in claim 30, discloses wavelength router for receiving, at an input port, a beam having a plurality of spectral bands and directing subsets of the spectral bands to respective ones of a plurality of output ports, the wavelength router comprising:

means for collimating the beam (see col. 14, lines 47);

means for dispersing the collimated beam into a plurality of angularly separated beams corresponding to the spectral bands (see col. 14, lines 48-50);

means for rotating polarization components of the angularly separated beams (see col. 14, lines 52-53); and

means for routing the angularly separated beams to the output ports (see col. 14, lines 55-56).

Patent 415 discloses wavelength router as disclosed above comprising of polarization rotation element and differ from the claimed invention in that patent 415 does not specifically disclose means for 90 degree rotation of polarization component of the beams. However, it is well known that there are various types of polarization rotation element, such as quarter-wave plates, half-wave plates or full-wave plates, which rotates the beam to different angles of rotation. Holland is cited to show such well known concept. In col. 4, lines 40-47, Holland discloses various types of wave plates to rotate the polarization of the beams at various angles. Therefore, it would have been obvious to an artisan of ordinary skill at the time the invention was made to provide means for 90 degree rotation of polarization component of the beams to the wavelength router of patent 415. One of ordinary skill in the art would have been motivated to so such in order to retard the polarization state of the optical signal and induce a unique state of polarization to the signal.

Allowable Subject Matter

4. Claims 16-22, 31, 32, 38 and 39 are allowed.

5. The following is a statement of reasons for the indication of allowable subject matter:

The present application is directed to a nonobvious improvement over the invention described in Patent No. 6,751,415 to Fabiny. The improvement comprise a quarter-wave plate having a fast axis oriented substantially at an odd multiple of 45 degrees with respect to a polarization axis of the spectral bands. This patentable distinction is included in independent claim 16.

The present application is directed to a nonobvious improvement over the invention described in Patent No. 6,751,415 to Fabiny. The improvement comprise a quarter-wave plate having a fast axis oriented substantially at an odd multiple of 45 degrees with respect to a polarization axis of the angularly separated beams. This patentable distinction is included in independent claim 16.

The present application is directed to a nonobvious improvement over the invention described in Patent No. 6,751,415 to Fabiny. The improvement comprise a quarter-wave plate having a fast axis oriented substantially at an odd multiple of 45 degrees with respect to a polarization axis of the spectral bands. This patentable distinction is included in independent claim 31.

The present application is directed to a nonobvious improvement over the invention described in Patent No. 6,751,415 to Fabiny. The improvement comprise means for 45 degree rotation of polarization components of the angularly separated

beams, wherein such means for 45 degree rotation has a fast axis oriented substantially at an odd multiple of 45 degree with respect to a polarization axis of the angularly separated beams. This patentable distinction is included in independent claim 38.

6. Claims 7, 30 and 37 objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Conclusion

7. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Dalzid Singh whose telephone number is (571) 272-3029. The examiner can normally be reached on Mon-Fri 9am - 5pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jason Chan can be reached on (571) 272--3022. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

April 21, 2003
Dalzid Singh